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Indian Standard

SPECIFICATION FOR *iso*-BORNYL ACETATE

(*First Revision*)

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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January 1985

Indian Standard

SPECIFICATION FOR *iso*-BORNYL ACETATE

(*First Revision*)

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(*Continued on page* 11)

Indian Standard

SPECIFICATION FOR *iso*-BORNYL ACETATE

(First Revision)

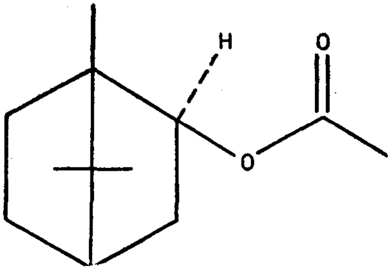
0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 16 August 1984, after the draft finalized by the Natural and Synthetic Perfumery Materials Sectional Committee, had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 This standard was first published in 1967. The Sectional Committee responsible for its preparation felt that the standard should be revised with a view to bring it in line with trade practice in perfumery technology and also align with the quality level of the material currently manufactured and sold in the country.

0.3 In this revision, the gas chromatographic method which is being progressively used in the country has been included and the wet method of analysis for determination of ester content has been deleted. Requirements for relative density and refractive index have also been modified.

0.4 *iso*-Bornyl acetate ($C_{12}H_{20}O_2$) is a commercially available perfumery chemical. It is not reported as being found in nature. It is represented by the following structural formula:



iso - BORNYL ACETATE

(Molecular Mass 196·28)

0.5 In the preparation of this standard, considerable assistance has been derived from the following publications:

EOA No. 74, 1975 Standard for *iso*-Bornyl Acetate, published by the Essential Oil Association of USA, New York.

The Givaudan Index 1978, published by the Givaudan — Delawanna, Inc., New York.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for *iso*-bornyl acetate.

2. TERMINOLOGY

2.1 For the purpose of this standard, definitions given in IS : 6597-1972† shall apply.

3. REQUIREMENTS

3.1 Description

3.1.1 *iso*-Bornyl acetate shall be obtained by treatment of camphene with acetic acid, usually in the presence of a catalyst or by acetylation of *iso*-borneol.

3.1.2 The material when freshly prepared shall be a clear, colourless liquid but, on storage acquires a pale straw shade. It shall be free from sediment, suspended matter and adulterants.

3.1.3 The material shall be examined for its colour, clarity, suspended matter and sediments when examined by the method prescribed in IS : 326 (Part 2)-1980‡.

3.2 Solubility — The material shall be clearly soluble in three volumes of ethanol (70 percent by volume) when tested as prescribed under **8** of IS : 326-1968§.

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*Rules for rounding off numerical values (*revised*).

†Glossary of terms relating to natural and synthetic perfumery materials.

‡Methods of sampling and test for natural and synthetic perfumery materials: Part 2 Preliminary examination of perfumery materials and samples (*second revision*).

§Methods of sampling and test for natural and synthetic perfumery materials (*first revision*).

3.3 The material shall also be tested olfactorily and especially for by-notes as prescribed under **4** and **5** of IS : 2284-1963*.

3.4 The material shall also comply with the requirements given in Table 1.

TABLE 1 REQUIREMENTS FOR *iso*-BORNYL ACETATE

(*Clauses* 3.4 *and* 6.1)

Sl No.	Characteristic	Requirement	Method of Test, Ref to	
			Indian Standard	Appendix
(1)	(2)	(3)	(4)	(5)
i)	Odour	Strong pine-like camphoraceous	IS : 2284-1963*	—
ii)	†Relative density at 27/27°C	0·981 0 to 0·985 0	IS : 326 (Part 3)-1980‡	—
iii)	§Refractive index at 27°C	1·464 0 to 1·469 0	Cl 7 of IS : 326-1968‖	—
iv)	Acid value, *Max*	0·5	IS : 326 (Part 7)-1980¶	—
v)	*iso*-Bornyl acetate, percent by mass, *Min*	90	—	A
vi)	Total assay content, percent by mass, *Min*	98	—	A

*Method for olfactory assessment of natural and synthetic perfumery materials.

†The correction factor for relative density for each degree celsius change in temperature is 0·000 73.

‡Methods of sampling and test for natural and synthetic perfumery materials: Part 3 Relative density (*second revision*).

§The correction factor for refractive index for each degree celsius change in temperature is 0·000 42.

‖Methods of sampling and test for natural and synthetic perfumery materials (*first revision*).

¶Methods of sampling and test for natural and synthetic perfumery materials: Part 7 Determination of acid value (*second revision*).

4. PACKING AND MARKING

4.1 Packing — The material shall be packed in glass-bottles, tins or galvanized drums or in aluminium containers as agreed to between the purchaser and the supplier.

---

*Method for olfactory assessment of natural and synthetic perfumery materials.

4.2 Marking — Each container so filled shall bear legibly and indelibly the following information:

a) Name of the material;
b) Name of the manufacturer and recognized trade-mark, if any;
c) Net mass of the material; and
d) Batch number.

4.2.1 The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING

5.1 Representative samples of the material, each containing not less than 50 ml, shall be drawn as prescribed in IS : 326 (Part 1)-1984*.

5.2 Number of Tests

5.2.1 Test for determination of *iso*-bornyl acetate content, shall be conducted on each of the individual samples separately.

5.2.2 Tests for the determination of all the remaining characteristics shall be conducted on the composite sample.

5.3 Criteria for Conformity

5.3.1 *For Individual Samples* — For the characteristic of *iso*-bornyl acetate content, determined on the individual samples, the mean (X) and range (R) of test results shall be calculated. The valve of the expression ($X - 0{\cdot}6\,R$) shall be calculated from the relevant test results. If the value so obtained is greater than or equal to the minimum limit [Table 1, Sl. No. (v)] the lot shall be declared as conforming to the requirement of this characteristic.

5.3.2 *For Composite Sample* — The lot shall be considered as conforming to the specification, if the composite sample satisfies all the other relevant requirements specified in the standard.

---

*Methods of sampling and test for natural and synthetic perfumery materials: Part 1 Sampling (*second revision*).

6. TEST METHODS

6.1 Tests shall be carried out as prescribed under **3.1**, **3.2**, **3.3** and the appropriate references specified in col 4 and 5 of Table 1.

6.2 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1977*) shall be employed in tests.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the results of analysis.

APPENDIX A

[*Table* 1, *Items* (v) *and* (vi)]

GAS CHROMATOGRAPHIC ANALYSIS FOR DETERMINATION OF *iso*-BORNYL ACETATE AND TOTAL ASSAY CONTENT

A-0. GENERAL

A-0.1 The chromatographic conditions given here are for guidance only.

A-0.2 Outline of the Method — A sample of the material is dissolved in a suitable solvent (for example, cyclohexane and diethyl ether) and is injected into the gas chromatograph when it is carried by the carrier gas from one end of the column to the other. During its movement, the constituents of the sample undergo distribution at different rates and ultimately get separated from one another. The separated constituents emerge from the end of the column one after another and are detected by suitable mean whose response is related to the amount of a specific component leaving the column.

A-1. APPARATUS

A-1.1 Any gas chromatograph capable of being operated under conditions suitable for resolving the individual constituents into distinct peaks may be used. The typical chromatogram for *iso*-bornyl acetate using a chromatograph with the following chromatographic conditions is shown in Fig. 1.

---

*Specification for water for general laboratory use (*second revision*).

Sample	*iso*-Bornyl acetate
Column	
a) Material	Copper
b) Length	5·49 m
c) O. D.	0·635 cm
d) I. D.	0·476 cm
e) Stationary phase	FFAP*, 10 percent by mass
f) Solid support	Chromosorb WAW 60-80 mesh
Carrier Gas	Hydrogen
Conditions	
a) Column temperature *iso*-thermal	150°C
b) Injection port temperature	200°C
c) Carrier gas flow rate	40 ml/min
d) Inlet pressure	3·5 kg/cm^2
Detector	
a) Type	Thermal conductivity
b) Temperature	285°C
Recorder	
a) Span	1 m/v
b) Chart speed	0·635 cm/min
Attenuation	4

NOTE — This analysis may also be accomplished with columns containing carbowax 20 M, DE.G.S. (Diethylene Glycol Succinate).

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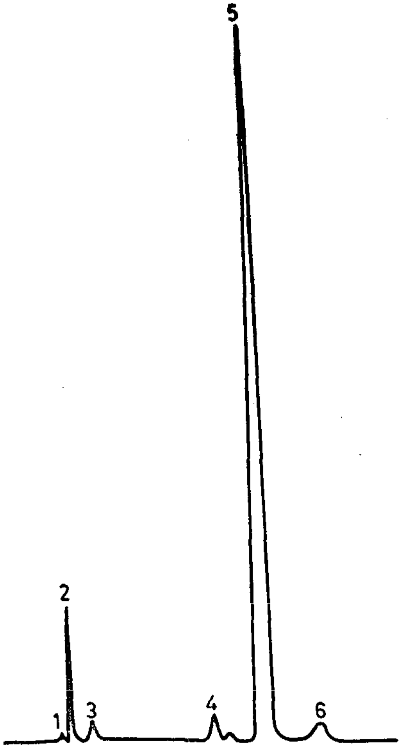
*Free Fatty Acid Phase (FFAP) is carbowax 20 M treated with nitrophthalic acid.



1 — Air
2 — Solvent
3 — Tricyclene and camphene
4 — *iso*-Fenchylacetate
5 — *iso*-Bornyl acetate
6 — Bornyl acetate

FIG. 1 TYPICAL CHROMATOGRAM OF *iso*-BORNYL ACETATE

A-2. PROCEDURE

A-2.1 Conduct the flow of the carrier gas and inject the sample (dissolved in the suitable solvent) at inject port where it is vapourized and well mixed with the carrier gas. This is led into the chromatographic column wherein vapourized constituents of the sample are separated out by virtue of their differing interaction with the stationary phase. As the different constituents pass through this detector, they give signals corresponding to the amount of particular constituent leaving the column. The detector signals, on transmission to the recorder plots the chart. Form the specific area under various peaks corresponding to specific constituents, the quantities of different constituents are determined.

NOTE — For the separation to be efficient, it is necessary that the column is maintained at the tamperature suggested throughout the time required for the resolution of the constituents.

A-3. CALCULATION

A-3.1 Area Measurements (*see* Note 1) — Since normal peaks approximate a triangle the area is measured by multiplying the peak height times the width of half height. The normal peak base is not taken since large deviations may be observed due to tailing or adsorption. This technique is rapid, simple and fairly accurate when peaks are symmetrical and of reasonable width.

A-3.2 Area Normalization (*see* Note 2) — By normalizing, it is meant, calculating the percentage composition by measuring the area of each and dividing the individual areas by total area for example:

$$\text{Percentage of } A = \frac{\text{Area of } A}{\text{Total area}} \times 100$$

NOTE 1 — Other methods of area measurements, namely, triangulation, disc integrator and electronic digital integrator if fixed with GLC machine would be of great advantage.

NOTE 2 — Internal standardization can be used if pure appropriate internal standard is available. This method is known as relative or indirect calibration.

(*Continued from page* 2)

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Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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